

a practical point of view, of immense importance. These are, however, minor blemishes of the author's work; the important thing is that he has given us an eminently useful and readable book on a subject which has too long been neglected in this country.

The second part of the volume under review deals in great detail with the leakage of induction motors and its predetermination. It is a careful investigation of all the different items which influence leakage, power factor, and overload capacity. The subject is highly technical, and will, therefore, mainly interest the designers of induction motors. Specialists in this branch will, however, find the author's method of dealing with the question of leakage, and especially his diagrams and tables, very useful.

GISBERT KAPP.

### OUR BOOK SHELF.

*Practical Microscopy. An Introduction to Microscopical Methods.* By F. Shillington Scales. Second Edition. Pp. xvi+334. (London: Baillière, Tindall and Cox, 1909.) Price 5s. net.

ALTHOUGH nominally this is a second edition of Mr. Scales's "Elementary Microscopy," published in 1905, yet it is in effect a new book. The first edition was not so pretentious, and did not attempt to give so much information on widely varying branches of microscopy; in fact, if any criticism may be offered, it is that now too much is attempted.

The actual practical instruction in the use and manipulation of the microscope is particularly lucid, and it is difficult to imagine that it could be expressed more clearly. The theoretical side is practically untouched, perhaps wisely so, as to have gone into the theory with sufficient fulness to have made it intelligible to the ordinary reader would have entailed a great increase in the amount of matter.

The subject of photomicrography has been touched on, and this constitutes an entirely new chapter in the book, as in the first edition no attempt was made to deal with it at all. The instructions given are clear, but are in some respects not so full as an earnest student would desire.

The recently re-introduced methods of dark ground illumination are described, and practical instructions are given in the use of typical illuminators. The various methods of illumination of opaque objects are fully dealt with, both by means of an ordinary condensing lens used in conjunction with low powers and by vertical illuminators for use with high powers.

In general, the book may be commended to any student who requires to use the microscope for ordinary laboratory purposes or for research, as one that will afford him all the practical assistance he is likely to require in the course of his work.

*Erosion of the Coast and its Prevention.* By F. W. S. Stanton. Pp. 68. (London: St. Bride's Press, Ltd., n.d.) Price 3s. net.

THIS book is a reprint of a series of articles which recently appeared in *Public Works*.

It consists of five "parts," or chapters, relating respectively to general observations on coast erosion; the agents of destruction and construction, and their effects on the English coast; land reclamation and coast defence; with an appendix on the Thames estuary. There are several maps showing the coast of England and illustrations of defence works. The maps appear to have been reproduced from larger drawings, the writing and names of places being so diminished and indistinct as scarcely to be legible, even with the aid of a magnifying glass.

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The contents of the book form an interesting summary of the condition of coast erosion and protection in England, suitable for a serial publication, but they are of too general and superficial a character to be of any use as a text-book on the subject, and contain no information of consequence that has not been more fully dealt with in books already published. The author does not appear to have made any use of the information contained in the evidence laid before the Coast Erosion Commission, and the fact of this commission being in existence is only once casually mentioned.

The author attributes the destruction of the coast, amongst other agencies, to the action of undercurrents below low water, and of submarine springs and "animal borers," and states that the consideration of such agents of destruction "leads to feelings approaching despair," and "bordering on consternation when the formation of the coast consists of glacial deposit, the London Clay and the like." It would have been more satisfactory if this theory had been supported by instances where this occurs. Although it is also stated that this class of erosion is beyond prevention, in another part of the book a solution of the difficulty is described as being effected by means of submerged chain cable groynes, and it is stated, on the authority of the inventor of this scheme, that these groynes have been laid on flat, sandy shores with excellent results. The locality where this has been done is not given, nor any particulars as to the condition of the shore before and after their use.

*The Evolution of the Sciences.* By L. Houllevigue. Translated from the French. Pp. 318. (London: T. Fisher Unwin, 1909.) Price 6s. 6d. net.

In his preface to the English edition of his book, M. Houllevigue explains that it is not his object to teach men of science anything. "I only wish," he writes, "to interest those who love science as outsiders in the general ideas which form the atmosphere of the laboratory, and, above all, to make them familiar with that superior form of common sense which is called the scientific spirit." Nine subjects are dealt with—the tendencies of chemistry, transmutation and Sir William Ramsay's experiments, the existence of matter, the interior of the earth, the sun, eclipses, the Milky Way, the organisation of matter, and the frontiers of the sciences. Each essay presents the broad aspects of the subject surveyed, and is well calculated to set students thinking about fundamental principles of science. Judging from the absence of reference to work by Joly on radio-activity in relation to the age of the earth, Hale on his solar observations, Kapteyn and Eddington on star-drifts, and other researches of recent years connected with the subjects described, the author has not kept in close touch with all the points in which progress is now being effected.

*History of Astronomy.* By Prof. G. Forbes, F.R.S. Pp. ix+154; illustrated. (London: Watts and Co., 1909.) Price 1s. net.

In this small volume Prof. Forbes describes the evolution of astronomical knowledge under three periods—the geometrical, the dynamical, and the physical. In addition, in book iii. he also describes the evolution of the instruments which have enabled astronomers of all ages to contribute to the store of knowledge on which our present-day astronomy is based.

The geometrical period covers the ages which elapsed between the time when man simply "wondered" and the time when his collected observations and knowledge had prepared the way for Kepler. This is a very interesting section, in which the methods and ideas of early astronomers are so clearly explained as to demand the attention of the general reader.

As a reference to ancient observations it should also prove valuable.

The dynamical period will appeal more to the student, its main theme being, of course, the establishment of the principles of universal gravitation by the work of Kepler, Newton, Laplace, Halley, and the others. The section on observation gives an abbreviated account of the methods and instruments employed in the more important and epoch-making researches, and contains a deal of interesting matter.

The fourth book, dealing with the physical period, is, perhaps, the least satisfying, but the chief reason for this, probably, is the confined space in which a tremendous amount of matter has to be discussed. As the author states on p. 147, he has been "compelled so often by the limits of space to stimulate without satisfying inquiry," and on these lines the book must be welcomed as a success. Those stimulated will find a useful, brief bibliography, to assist them in their further inquiries, given at the end of the volume.

W. E. R.

*Wild Flowers and Trees of Colorado.* By Dr. F. Ramaley. Pp. viii+178. (Boulder, Colorado: A. A. Greenman, 1909.)

This book consists of two chapters, in the first of which the author presents a general sketch of the vegetation, and in the second he deals with the forests. Vegetation in the State of Colorado is exceedingly diverse by reason of the varied conditions of climate, and owing to the great variation in altitude the vertical distribution is more pronounced than the horizontal distribution, so that the author groups his associations according to the zones of elevation. There is little information regarding specific wild flowers beyond the illustrations of a dozen selected types and no systematic enumeration is supplied. The book is copiously illustrated with photographs of characteristic scenes or formations and the flowers referred to, making the text shorter than might be anticipated. The survey of the forest formations is more concrete, and twenty of the principal tree or shrubby genera are detailed with respect to the species and their diagnostic characters. The author announces the book as an introduction to Colorado botany, so that he may perhaps be subsequently induced to compile a flora of this interesting region.

(1) *The Historic Thames.* By Hilaire Belloc. Pp. 204. (London: J. M. Dent and Co., 1909.) Price 3s. 6d. net.

(2) *The Heart of England.* By E. Thomas. Pp. xi+244. (London: J. M. Dent and Co., 1909.) Price 3s. 6d. net.

(1) THE first of these prettily-bound volumes is a new, cheaper edition of Mr. Belloc's essay on the Thames, which was issued originally in a limited edition, costing a guinea net. The Thames and its valley is dealt with from every point of view, and the interesting description reveals an intimate knowledge of the subject. The reader's task would have been easier had the book been divided into chapters; the index, notwithstanding its completeness, scarcely takes the place of a judicious division of the essay into sections according to subjects.

(2) The second volume is a similar re-issue of essays on subjects the most diverse. Ranging as they do from "Walking with Good Company" to "The Harvest Moon" or "Fishing Boats," they will make an appeal to readers who can enjoy something other than wild adventure or thrilling incident. Mr. Thomas does not treat his subjects too seriously, and to read his essays will give much the same pleasure as listening to bright, pleasant conversation in which quiet humour takes its proper place.

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## LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

### Are the Senses ever Vicarious?

THE interesting correspondence in NATURE of December 2 from Mr. G. I. Walker and Prof. McKendrick has reminded me of a passage in Nietzsche which will be found at the end of paragraph 192 of "Beyond Good and Evil." The passage has been translated as follows:—

"In an animated conversation I often see the face of the person with whom I am speaking so clearly and sharply defined before me, according to the thought he expresses, or which I believe to be evoked in his mind, that the degree of distinctness far exceeds the strength of my visual faculty—the delicacy of the play of the muscles and of the expression of the eyes must therefore be imagined by me. Probably the person put on quite a different expression or none at all."

Nietzsche's experience appears to suggest that a presentation, which is in form purely visual, may show evidence of a synthesis out of elements which are not solely of visual origin. No doubt, as Nietzsche says, the imagination plays an important part, and the same may be said of the memory; but Mr. Walker's experience seems to prove that in his case some of the elements out of which such a visual presentation are synthesised may be definitely of auditory origin. Perhaps to a psychologist this may not appear very surprising; but it certainly does seem a little surprising that, when the main source of Mr. Walker's visual experiences was cut off by the loss of his sight, the surviving auditory elements should alone be strong enough to continue to evoke presentations in visual form.

That the above is the explanation of Mr. Walker's experiences there seems little doubt. The play of expression which he "sees" will naturally follow the variations in the tone, &c., of the speaker's voice; but it is scarcely so certain that it will reproduce the actual expression of the speaker. As to the circumstance that Mr. Walker only "sees" the upper part of the speaker's face, as a rule, one may hazard the guess that this arises from the fact that in conversation the attention is generally concentrated on that part, with the result that the elements corresponding to it in the visual presentation are the most intense, and hence most likely to survive the destruction of their principal source. Presumably that which Mr. Walker sees is devoid of colour; but it would be interesting to know how the present intensity of his visual presentations compares with their intensity when he originally lost his sight.

Mr. Walker's preference for a position at an angle to the speaker possibly depends on the fact that he thereby secures a more marked difference between the sensations proceeding from the two ears—a difference analogous to the difference between the sensations received from the two eyes.

HUGH BIRRELL.

Holyrood House, Bo'ness, Linlithgowshire, N.B.,  
December 8.

THE very interesting observations recorded in Mr. Walker's letter in NATURE of December 2 confirm in a remarkable manner the view I have always held, that in a very literal sense "seeing is believing"; that is, that a visual image is not an image on the retina, but a mental representation of what the percipient believes to be before him. As a rule, no doubt this mental representation is suggested by sense impressions coming *via* one or both optic nerves, but this is not necessarily the case; and it ought to cause Prof. McKendrick no surprise whatever to find Mr. Walker, though blind, perceiving visual images, which in his case are apparently suggested mainly by sense impressions coming through the auditory nerve.

There are, of course, plenty of arguments drawn from everyday life which point to the same conclusion, but which are so commonplace that we take them for granted without attempting to analyse their significance. I will